Aenetus trigonogrammus Beaver & Moore, 2020

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Planning and Organization Meetings

A quarterly meeting is scheduled in order to plan club activities and the magazine. See BOIC Programme.

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Membership fees are $30 for individuals, schools, and organizations.

Aims of the Organization

- To establish a network of people growing butterfly host plants;
- To hold information meetings about invertebrates;
- To organize excursions around the theme of invertebrates e.g. butterflies, native bees, ants, dragonflies, beetles, freshwater habitats, and others;
- To promote the conservation of the invertebrate habitat;
- To promote the keeping of invertebrates as alternative pets;
- To promote research into invertebrates;
- To encourage the construction of invertebrate friendly habitats in urban areas.

Magazine Deadlines

If you wish to submit an item for publication the following deadlines apply:
March issue – February 1st June issue – May 1st
September issue – August 1st December issue – November 1st
All articles should be submitted directly to the Editor daphne.bowden1@bigpond.com

Cover Painting

Aenetus trigonogrammus Beaver & Moore, 2020 – Painting by Peter Hendry from an original photograph by Peter Hendry

From the President

This issue certainly provides lots of interesting reading as, once again, a significant number of writers have put in a lot of research, observations and time to bring to us the results of this "work". Thanks go to Dennis Bell, Bernie Franzmann, Paul Grimshaw, Peter Hendry, Wesley Jenkinson, John Moss and also to Daphne for weaving it all together - again (for the 98th time).

You will have read in the President's Annual Report, published in the last edition of our magazine, of John's deep involvement with the club for 25 years and that he had recently retired from direct committee involvement. At a recent meeting of our management committee it was unanimously decided to award life membership to John in recognition of his many contributions.

As all copies of the fourth edition of our host plant book released in April last year have been sold, a revised fourth edition has now been printed. Thanks again John for the additional records.

"NewsBOIC" which Dawn innovated to get us through "the lockdown" has been a great success. There is obviously quite a lot of research and design that goes into producing the bulletin and we are deeply appreciative of this.

Let's hope that this virus problem is put behind us soon so that we can get together for meetings, talks and field trips again.
Best wishes *Ross*

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Description of new moth species prompts reflection on owning a bush block - *Peter Hendry*

Around the middle of 2003 my wife Beverly, my brother Quentin and I purchased a bush block which sits about 56 km west south west of Bundaberg and approximately 27 km south west of Gin Gin, Queensland. It contains 770 acres of bushland bounded on the southern border by a 1.5 km stretch of the Perry River, a tributary of the Burnett. The block is divided, almost in equal halves, by a basically unused public road that ends on the western boundary. The northern half is further divided by the seasonally dry Fig Tree Creek. The southern section, particularly along the river and the many gullies that flow into it, is dominated by a rich diverse dry vine scrub. The more open northern section is composed of eucalypt open forest and woodland.

In the early days my main priority was botany and to this end the block held many gems. One such gem is the rare *Cycas megacarpa*, an extraordinary example of which was discovered by our current president Ross Kendall in 2006 (Fig. 1) (the image depicts John Moss standing at the base of what is approximately a seven-metre tall specimen). The block is also the habitat for the Yellow-bellied Glider (*Petaurus australis*); the call of which has been described as a loud shriek which leads into a gurgling, throaty rattle and sounds like some poor creature being strangled and shaken; a sound it makes only when in flight making it sound even more unnerving. This was certainly the case one night when four grown men, myself, Quentin, John Moss and Martin Bennet who was helping with a plant survey, were awakened by the call. I remember thinking, if there is really any such thing as a Banshee, it is out there now!

Fig. 1

Another animal encounter was dubbed 'the night of the frogs'. It was during the construction of the shed, which was a rather back to front affair, with the shed going up first and the concrete floor laid last. It was built over several trips to the block, with Quentin as chief engineer ably assisted by John Moss, myself and elder son Quinn. We laid the last of the concrete floor, pumping water from the last small water hole in the creek and using creek gravel to supplement our dwindling supply of

purchased gravel. Quentin and Quinn had left as Quentin was working the next day while John and myself, stayed on planning to leave in the morning. We were hit by one of S.E. Queensland's classical summer storms, it simply poured down. I took the opportunity to shower under the gutter where the down pipe was still to be connected; while drying off in the shed the sound of the rain on the roof was deafening. After about a half hour of solid rain it completely stopped. The last job of the day was to retrieve the pump from the water hole in the creek. While there, I could hear what I first thought was a waterfall, but knowing the layout of the creek this was quickly dismissed and as I looked up, I could see a large quantity of leaves being pushed down the creek followed by water, and lots of it! John and I stood and watched the whole creek line fill with water, up to the top of the lower bank. The depth of the water hole, which was about half a meter deep when we were using it to pump water from, was now over two meters deep. That night the frogs came out in their hundreds, if not thousands! We counted about 9 species including the Ornate Burrowing Frog (*Platyplectrum ornatum*) (Fig. 2) which we had encountered earlier while digging gravel from the "dry" creek bed. Trying to sleep that night was impossible as the sound of the frogs was, I swear, louder than the sound of the rain on the roof during the height of the storm.


Fig. 2


Fig. 3

The block has provided the background for many articles published in *Metamorphosis Australia* (MA) and its earlier incarnation the BOIC Newsletter (BOIC-NL). In the BOIC-NL No. 32 March 2004 in an article titled: *The not so elusive Four-barred Swordtail*, I wrote of my search and joy of finding, in large numbers, the Four-barred Swordtail (*Protographium leosthenes*). The article also included our encounter with thousands of Cluster Moths (*Dichomeris capnites*) (Fig. 3) and hundreds of the Grannies Cloak Moth (*Speiredonia spectans*). In the BOIC-NL No. 41 June 2006, I co-authored an article with John Moss titled: *New host plant and attendant ants for the Satin Azure butterfly* [Ogyris amaryllis hewitsoni (*Waterhouse, 1902*)], a discovery we made on the banks of the Perry River.


Fig. 4


Fig. 5

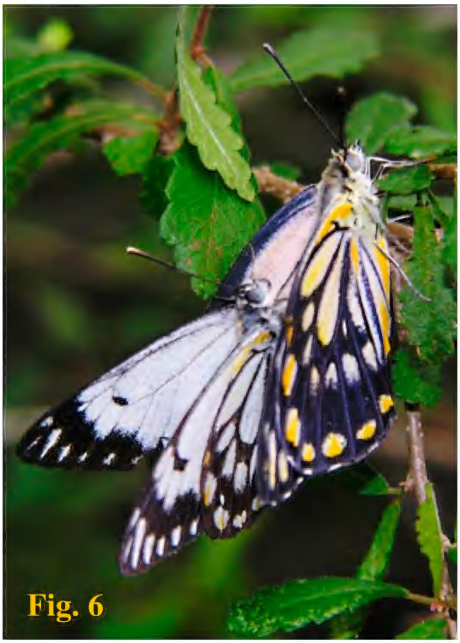
Fig. 6

In the BOIC-NL No. 43 December 2006, I wrote about a large colony, in the northern half of the block, of the Common Imperial Hairstreak (*Jalmenus evagoras evagoras*) and in a sub article asked the question do butterflies kiss? (Fig. 4). In the BOIC-NL No. 45 June 2007 in an article titled *A Fascinating Phasmid* I wrote about the Spiny Leaf Insect (*Extatosoma tiaratum*) (Fig. 5), found by John on one of our walks along a track running parallel to the river bank. The BOIC-NL No. 47 December 2007 saw an article titled *The Caper White Migration* (repeated in MA No. 76 March 2015) in which I wrote about a mating frenzy that John and I witnessed, of the Caper White (*Belenois java*) (Fig. 6) in the vine scrub by the river. In the same newsletter, the article *At the Light Trap* referenced butterflies that had come to light at various places and included reference to a large yabby John found wandering past the light trap set up beside the shed one rainy night.

Speaking of the light trap, it was on the block before the shed was built that I was first introduced to light traps, when John set up his trap one night. I still remember we had a large Cossid moth come in, something I had never seen before. In MA No. 49 June 2008 the article *The Night of the Crambidae* listed fifteen different species of Crambids that came to light in one night over the Easter period of that year. This was followed by an article titled *The Return of the Crambidae*, in MA No. 54 September

2009. In this article I listed 24 different species of Crambids that came to two light traps situated one and a half kilometres apart, over a three night period, during Easter 2009. (Fig. 7, *Pycnarmon meritalis* (Crambidae)). *Life history notes on the moths* Gonodontis luteola (*Turner, 1904*) (*Lepidoptera* : *Geometridae*) *and* Speiredonia


Fig. 7


Fig. 8

spectans (*Guenèe, 1852*) (*Lepidoptera* : *Noctuidae*) is the title of an article published in MA No. 61 June 2011. Co-authored by myself and John Moss it deals with the discovery, by John and Ross Kendall in November of 2005, of the larva (Fig. 8) and host plant of *Gonodontis luteola* and larva (Fig. 9) and host plant of the Grannies Cloak Moth (*Speiredonia spectans*). In MA No. 76 March 2015 in an article titled *A Summer of Butterflies 2014/2015* (*aka the Year of the Tiger*) I wrote of the large numbers of males of the Yellow Albatross (*Appias paulina*) (Fig. 10) mud puddling along the road to the block and along the river which formed our southern boundary. It had been a particularly good year for the Blue Tigers (*Tirumala hamata hamata*) so my brother and I were surprised to find so many Yellow Albatrosses, and while they do not mud puddle, only a few Blue Tigers were to be found anywhere on the block.


Fig. 9


Fig. 10

But something else has prompted all this reminiscing about our bush block, apart from the fact it was sold in early 2019. There was one more discovery which has recently come to fruition. On the 27th October 2011 at a light trap set up beside the shed, I collected a Ghost Moth (Hepialiade in the genus *Aenetus*) the one and only, to

date, *Aenetus* I have collected. I struggled to put a name on it and thought it might be an odd form of *A. splendens*. Fast forward to late 2019 and two South Australian Entomologists come to town for a conference. One, Ethan Beaver, I have had some minor correspondence with through a moth enthusiast web site. The other, Mike Moore [not to be confused with the American doco-conscious film director!], I knew nothing of and he proved to be a thorough gentleman. Both are experts on the Hepialidae and are working towards a monograph of the genus *Oxycanus*. Ethan has a passion for the genus *Aenetus* and has co-authored a paper on how to rear them; a difficult subject as they bore into wood rather than eat leaves. I received a message from Christine Lambkin of the Queensland Museum wanting to know if Ethan and Mike could visit and look over my collection. They had looked over the Museum collection and University of Queensland Insect Collection and were hoping to see as much material as they could during their visit. Of course, I replied yes, but then received an email from Ethan saying they were running out of time and could I send him images of my Hepialids. The image of my *Aenetus* species stirred things up a bit, as Ethan had found a similar species in the University of Queensland Insect Collection. It was in poor condition, in three pieces and he had passed it off as an aberration. With a second specimen Ethan knew he was on to something and he and Mike found the time to visit. I arranged for John Moss and Richard Zietek to bring their specimens along as well. Their expertise was immediately obvious and the names of my specimens were soon confirmed and the *Aenetus* sp. was definitely a new species. I had no trouble handing my specimen to Ethan who said he would formally name it. To this end I received an email from Ethan on the 9th of July 2020 containing a paper titled *Four new species of Splendid Ghost Moths* (*Lepidoptera: Hepialidae*: Aenetus) *from Australia and Papua New Guinea.* It was authored by Ethan P. Beaver, Michael D. Moore, John R. Grehan, Alejandro Velasco-Castrillón & Mark I. Stevens and published in Zootaxa.4809.3.2, 2020. The article contains the description of *Aenetus trigonogrammus* Beaver & Moore, 2020 (cover image) with the Holotype location being "our bush block". The specimen, one of only two known, is now housed in the Australian National Insect Collection in Canberra.

Fig. 11

So due to the naming of a moth, the block in a small way has become "immortal". An image (Fig. 11) showing the shed as viewed from the north side of Fig Tree Creek accompanied the description.

P.S. John tells me he still has the descendants of the Purple-spotted Gudgeons and Rainbow Fish rescued from Fig Tree Creek when the pool was drying up and that "Sara Lee" [derived from its taxonomic name *Litoria caerulea*] the green tree frog, rescued, at the block, from the mouth of a Red-bellied Black Snake, still lives in a terrarium at the Griffith Uni Ecocentre.

Photos Peter Hendry

ITEMS OF INTEREST

Observations on the life history of the Red-bodied Swallowtail, *Pachliopta polydorus queenslandica* (Rothschild, 1895) – *Dennis Bell*

Pachliopta polydorus (Linnaeus, 1763) is a butterfly widely distributed in the Australian region from the Moluccas through New Guinea to the Solomon Islands. In Australia it is represented by the subspecies *P. p. queenslandica*, the Red-bodied Swallowtail, which is distributed from the Torres Strait to south of Townsville. The early stages feed on plants in the *Aristolochiaceae* family.

Despite being restricted to tropical regions, the butterflies are quite adaptable and can be successfully maintained in Brisbane. Eggs laid during spring and summer will complete their life cycle in the same season, taking approximately 7 weeks to complete. Eggs laid from late April onwards usually develop at a slower rate and the resulting pupa overwinter to emerge as adults in late August/early September with the onset of warmer weather being the trigger to hatch.

During the summer months the egg (Fig.1) typically takes 6-7 days to hatch, the larva matures in approximately 3 weeks reaching 35-40mm in length. Larva typically have a brown body with red tubercles (Fig.2(a)) for most of their development however, during the final instar, the body of the larva develops a mottled colouration and the red tubercles become paler (Fig.2(b)). The pupa (Fig.3(a), (b)) take approximately 3 weeks to develop into the butterfly (Fig.4(a), (b), (c)). There is usually some spread in larval development and pupal duration times however the majority emerge as adults close to these times. Upon emergence adults do not cling onto the empty pupal case to dry but rather crawl away to find a spot where they can hang upside down and dry their wings. If they cannot reach anything, they will fall to the ground trying and their wings usually do not fill properly.


Fig. 1


Fig. 2(a)


Fig. 2(b)


Fig. 3(a)


Fig. 3(b)


Fig. 4(a)


Fig. 4(b)


Fig. 4(c)

Fig. 1 Egg; Fig. 2(a) 4th instar larva; Fig. 2(b) 5th instar larva; Fig. 3(a) Pupa ventral view; Fig. 3(b) Pupa dorsal view; Fig. 4(a) Female; Fig. 4(b) Adult male; Fig. 4(c) Adult undersides

When laying eggs, the females will be seen hopping from plant to plant testing each one if it is satisfactory. Once a suitable plant is found then it becomes a matter of testing which leaf is suitable. The butterfly will then hold onto the leaf, momentarily stop flapping its wings and curl its abdomen up under the leaf to deposit a single egg. Females typically start laying eggs about a week after emergence from the pupa and will then continue laying for about 3 weeks. They can produce a large number of eggs when conditions are good.

Suitable plants I have found eggs/larva on include *Aristolochia acuminata*, *A. macroura* (probably the most preferred food plant in this list), *A. esperenzae*, *A. grandiflora*, *A. indica*, *A. albida*, *Pararistochia deltantha*, *P. peninsularis*, *P. australopithecurus* and *P. praevenosa*. An egg, and subsequent larva, was once found on *A. meridionalis* subsp. *centralis* however from my observations neither this plant nor *A. thozetii* seem to be attractive for egg laying possibly due to their small size. For *Aristolochia* sp. most of the leaves and soft stems can be used however with *Pararistolochia* sp. only the soft new growth (leaves and stems) is eaten.

The butterfly is very particular when selecting a site on a food plant to deposit an egg. They require:
a) soft growth
b) a plant in the shade and
c) a low growing plant

The females lay either on low growing vines up to about one metre high or growing along the ground or seedlings. A fresh shoot either growing close to the ground or climbing up another plant is the preferred egg laying site. They will not lay eggs high up on vines as present in mature forests. This is similar to the habits of the Clearwing Swallowtail (*Cressida cressida*) which similarly selects plants growing very low to the ground.

Pachliopta polydorus has a restricted distribution when compared to either *Cressida cressida* or *Ornithoptera priamus*. Since they adapt well to conditions in Brisbane one would expect them to have a wider natural range than they do. It is most likely that their range is determined by the ready availability of the food plants growing in the desired manner for a large part of the year. With the range of native food plants available this only occurs in tropical areas and more so on Cape York Peninsula. Small plants of *Aristolochia* sp. (e.g. *A. acuminata* and *A .chalmserii*) are probably mainly used as edible growth is available for most of the year whereas *Pararistolochia* sp. only provide seasonal growth. Populations can also be maintained using an exotic species such as *A. macroura* in a garden setting. This plant is highly attractive for the butterfly to lay eggs on and larva readily eat the leaves and stems.

Both male and female butterflies have similar patterning and colouring however the males have slightly narrower forewings. Despite being a strong flier, the adults adapt well to an enclosure where they can live for 6-7 weeks. Most flying activity occurs

during the early morning and late in the afternoon with the butterfly resting the remainder of the time. They are attracted to flowers such as *Durantia repens*, *Pentas lanceolata*, and *Stachytarpheta* sp. and spend a lot of time feeding. At dusk they look for an overnight roosting spot in a protected, shaded area. Interestingly, they seem to identify a favourite location and will use that spot repeatedly.

Raising of larva is easily achieved with *A. acuminata* as both leaves and stems are eaten. *Pachliopta polydorus* larva consume a lot of leaves and can be messy eaters, eating out the centre of leaves. They also like to eat the stems from the ends. Luckily *A. acuminata* is a very large vine which grows vigorously through the summer months and can easily provide sufficient leaves for the larva throughout development.

FOOD PLANTS

Aristolochia macroura

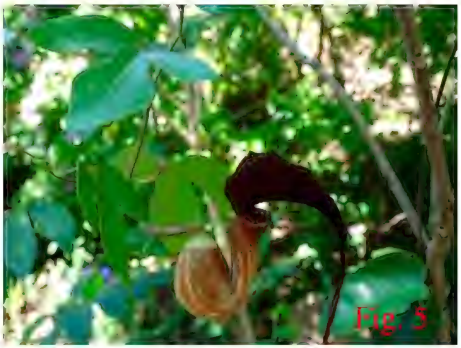
Fig. 5

The exotic *A. macroura* (Fig.5) is a plant which is highly attractive for egg laying. It is a medium sized vine easily grown in a garden setting and once established needs little attention. The plant sends out runners along the ground which will climb up other plants but it can easily be maintained as a low growing plant. Propagation is either by seed or from cuttings which strike readily. It is an unusual plant having leaves with three lobes resembling that of a *Passiflora* sp. and bizarre large flowers which have an offensive smell presumably to attract flies as pollinators. *Cressida cressida* also readily use the plant, with leaves close to the ground being very attractive for egg laying, and their larva develop well on it.

Aristolochia acuminata


Fig. 6

I use the native *A. acuminata* (Fig.6) for feeding the larva as it is a large vine which produces copious amounts of new growth. Also, it is easily grown in cultivation but requires a strong support or tree as it becomes a large vigorous vine which can easily overwhelm shrubs. Propagation is either from cuttings or more commonly from seed. It is best to grow the plant in a position with excellent drainage as the roots of the mature plants can rot if too much water is

present. Seedlings are readily used by *Cressida cressida* as a food plant and larger plants are also used if the females can find a spot to land and hold on while depositing an egg. It is also a food plant for larva of *Ornithoptera priamus* in Nth. Qld.

The plant is widely distributed throughout S.E. Asia to New Guinea and Australia. Consequently, there are various forms of the species which vary in their vigour and growth habits. I have seen the plant growing in Sabah and Penang with larva of a *Troides* sp. present and also near Lae in Papua New Guinea where the larva of *Ornithoptera priamus* were feeding on it.

Photos Dennis Bell

Ed.: The spelling of the scientific name *Pachliopta polydorus queenslandica* in this article is taken from the checklist in Braby's, The merging of taxonomy and conservation biology: A synthesis of Australian butterfly systematics (Lepidoptera: Hesperioidea and Papilionoidea) for the 21st century. *Zootaxa* .2707.1.1 December 2010.

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Lacewings – Beneficial Insects – *Bernie Franzmann*

A few years ago, I wrote an article on Australian ladybirds (Franzmann 2016). When we think about insects that are beneficial in the home garden, or in other commercial, agricultural situations, we usually think, firstly, of the ladybirds. There are of course many other groups of beneficials.

Note - this article is not about the beautiful lacewing butterflies of northern Australia.

The lacewings (Order Neuroptera) get their common name by having, well, lacy-looking wings, because of the extensive branching of the wing veins.

Lacewings go through a complete metamorphosis of an egg, larval and pupal stage, before becoming winged adults.

There are 14 families of Neuroptera in Australia, and they are a very diverse group.

The larvae of most of the families are predators of small insects, however, in one family, the Sisyridae, they feed on freshwater sponges.

Perhaps the most commonly-known larval stages are the antlions which construct cone shaped pits in the ground (Fig. 1). They bury themselves down in the bottom of the pits, with just their open jaws protruding. Wandering ants that fall into the pits are devoured by the larvae.

Sometimes, if the ants are struggling to climb up the side of the pits, the larvae flick sand at them to knock them down.


Fig. 2

Adults in one family, the Mantispidae, have raptorial front legs; just like preying mantids (Fig. 2). The larvae of some species in this family feed exclusively on spider eggs.

Anyway, getting back to "Beneficial Insects".

Although many species of lacewings are predaceous, only two of them have the qualities that make them significant biocontrol agents of pest insects in Australia.

They are the green lacewing (*Mallada signatus*), and the brown lacewing (*Micromus tasmaniae*).

The green lacewing

Green lacewing adults (Fig. 3) feed on nectar and honeydew secreted by aphids.

Adults live about 3-4 weeks. Females lay batches of eggs, with each egg placed on top of a slender silken stalk (Fig. 4).


Fig. 3


Fig. 4


Fig. 5

The larvae feed on many different types of small insects, such as mealybugs, psyllids, thrips, aphids, whiteflies, leafhoppers, scale insects, insect eggs and small caterpillars. They have hollow sickle-shaped jaws which they drive into prey, before sucking up the contents. The larvae camouflage themselves by covering their bodies with debris, which may include the husks of their sucked-out prey (Fig. 5).

During their larval life, of about three weeks, the larvae consume about 200 small insects per week.

Where naturally-occurring populations are insufficient to provide effective pest control green lacewings can be purchased. They are supplied as adults and/or eggs.

The brown lacewing

This species is similar to the green lacewing but the adults (Fig. 6), are predaceous; the eggs are not on stalks; the larvae are naked (Fig. 7), and they are not available commercially.


Fig. 6


Fig. 7

Both lacewing species eat, depending on prey size and other factors, about 500 insects during their larval development.

To finish off with an interesting aspect of lacewing life: larvae don't poo but retain their waste until they become adults. Wouldn't parents with a new baby/toddler of the species *Homo sapiens* love that.

Reference

Franzmann B (2016) Ladybirds *Metamorphosis Australia.* Issue No: 81

IMAGES

Fig.1 – Two antlion pits (B. Franzmann)
Fig.2 – Mantispid (Wikimedia – Jean and Fred from Perth)
Fig.3 – Green lacewing (Wikimedia – Charles J. Sharp)
Fig.4 – Green lacewing eggs (Wikimedia – Antonios Tsolis)
Fig.5 – Green lacewing larva (Wikimedia – RudiSteenkamp)
Fig.6 – Brown lacewing (Wikimedia – Joseph Berger)
Fig.7 – Brown lacewing larva (Wikimedia – Jacy Lucier)

Life history notes on the Black-ringed Ochre, *Trapezites petalia* (Hewitson, 1868) Lepidoptera: Hesperiidae – *Wesley Jenkinson*

This endemic skipper previously known as the Common White-spot Skipper has been recorded sporadically from coastal and subcoastal areas from northern Queensland to southern New South Wales including areas west of the Great Dividing Range in southern Queensland. The infilled map range in Braby 2000 has been extended in Braby 2016 to incorporate a continuous distribution range in north-eastern New South Wales. This assumes new intervening data and resembles the range-fill maps of its NSW distribution in the 1972 and 1981 publications of Butterflies of Australia by Common and Waterhouse.

In south-eastern Queensland this species is located chiefly in drier open forest and woodland where host plants are established. Within this region the adults can be seasonally locally common.

Adults could be confused with the rarely seen Yellow Ochre or Rare White-spot Skipper (*Trapezites lutea*) which has the hindwing underside white spot with black ring reduced, and the Small Orange Ochre or Orange White-spot Skipper (*T. heteromacula*) from northern Queensland which has two additional subterminal spots on the hindwing underside.

Adult flight is very rapid. While basking they typically settle in a 'skipper' pose with their wings open, facing towards the sun, revealing the upper side markings. Males can be observed strongly defending open sunny grassy glades (where the host plants are present), chasing off other males in rapid flight. They typically return to the same perching spot on grass stems or low vegetation, usually within two meters of ground level. The females also frequent the same areas along gullies looking for suitable ovipositing sites. Males appear territorial, often very rapidly chasing rival males and returning to the same perching site (A.F. Atkins in Braby 2000). They hilltop from mid-late morning to mid-afternoon, generally in a leeward area just below a hilltop summit away from any gusty wind. Both sexes are readily attracted to a wide range of small native and exotic flowers. Whilst feeding the wings may be open or closed.

Within Queensland, individual specimens show very minimal variation in the size of the pale-yellow and pale-orange markings on the upperside of the wings. The sexes are very similar in appearance, females can be identified by having more rounded wing termens and a slightly wider abdomen.

Wingspans for the pictured adult specimens are: males 29mm and females 29mm.

***Trapezites petalia* (Black-ringed Ochre)**
Images left to right: male, female, male underside, female underside

This skipper is known to utilise three *Lomandra* species listed by various authors in Braby 2000. These include *L. filiformis*, *L. longifolia* and *L. multiflora*. No additional *Lomandra* species have been included in Moss 2019. Further observation may possibly extend this list to other *Lomandra* species. *L. multiflora* has been observed to be the preferred host plant in general (P. Valentine, A.F. Atkins in Braby 2000) and is one of four smaller leaved Mat Rushes in SEQ near where John Moss and I have encountered the butterfly; the others being *L. confertifolia*, *L. filiformis* and *L. laxa*.

A female collected from near Beaudesert in early March 2018 was kept in captivity and laid several eggs. The eggs were laid singly on leaves of a *Lomandra* species supplied. Egg laying was not observed; however, they are usually laid singly near the base of a leaf of the larval food plant, (A.F. Atkins in Braby 2000). One larva was successfully raised on a known [Waterhouse, 1932] host plant, Long-leaved Mat Rush (*Lomandra longifolia*) which resulted in a little smaller than average size adult male, suggesting that this may not be a preferred host plant.

A freshly laid egg

4-day old egg

Eggs were 0.9mm wide x 0.8mm high, dome shaped, 18 longitudinal ribs, white when laid, with top half appearing reddish brown and the base a dull cream colour after 3 days.

Typical chewing from a young larva

The first instar larvae emerged at dawn and soon consumed their eggshells. Early instar larvae consumed small sections from the outer edge of the leaf, creating a 'V' shaped chewing above their silk lined shelters [see above image]. Larvae fed during dawn and dusk chewing from the outer edge of the leaves (similarly described by A. F. Atkins in Braby 2000). Several shelters were created as larvae grew. These were formed in between host leaves towards the base of the host plant. Pupation occurred in the final shelter in a leaf placed next to its previous shelter.

One larva completed five instars and attained a length of to 22mm, resulting in a smaller than average adult male. Average size larvae are 25 – 30mm long (Braby 2000).

1st instar larva

2nd instar larva

3rd instar larva

4th instar larva

5th instar larva

Pupa with discarded skin and head capsule

5th instar head capsule

The small pupa, measuring 15mm in length, was located in the final shelter. Average size pupae are 18 – 20mm long (Braby 2000).

The life cycle recorded during autumn and winter was less than 5 months, egg duration was 8 days, larval duration was 111 days while pupal duration was 26 days. The adult hatched in captivity during mid-winter without any form of heating. Under natural conditions the adult probably would have emerged at a later date early in spring. A second larva raised to final instar in the same conditions, during the same period, had a longer larval duration lasting a further 26 days but failed to pupate.

Within the new boundary of the Scenic Rim Regional Shire south of Brisbane, I have adult records from September to December and February to May, indicating that there are two generations per year in this region.

Andrew Atkins, in his landmark monograph on the Trapezitine skippers, in the *Biology of Australian Butterflies*, provided further information on this relatively common but rarely observed smaller species. The description was accompanied by Andrew's own detailed line drawings of male and female genitalia, larval head, pupa and pupal cap, with comparisons to another 16 of the (now) 18 Australian species. The most recently described of this genus, *T. atkinsoni* from southern WA, was first identified by Andrew and its naming is a fitting tribute to the Australian who did so much pioneering work on this iconic subfamily of endemic hesperiids.

Acknowledgements: I would like to thank John Moss for commenting on the manuscript.

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Observations and Notes on Donovan's Day Moth (*Cruria donowani*) from Mt Crosby, Brisbane Queensland, 19th March to 2nd of May 2020 – *Paul Grimshaw*

Some of this text and these photos are from a diary and study of the Donovan's Day Moth that I carried out over a few weeks in March/April this year.

The identity of this day flying moth species is ***Cruria donowani*** **(Boisduval, 1832)** now with the common name of Donovan's Day Moth.

Apparently Boisduval, the author of its scientific species name, used the French spelling of the name of the English naturalist Donovan (i.e. ***Agarista donowani***) in his original description, and after the species was moved from ***Agarista*** to the new genus ***Cruria***, that name (correctly!) persisted. It is not clear if it was Donovan who originally collected the specimen or a French naturalist with the first Dumont D'Urville South Seas Expedition.

We have had up to five day flying moths of the same species patrolling our bitumen driveway for more than 2 weeks. Their flight territory is approximately 10 to 12 metres long and 3 metres wide and includes four various sized trees on either side of the driveway, on the trunks of which they sit in head down position. They fly and patrol constantly just like some butterflies do, but regularly return to rest on the tree trunks.

There are three of these moths left patrolling here now. I have been able to get some decent photos of one of the dominant moth individuals with a small piece missing from its right hindwing. I am not keen to capture the moths as specimens, so I will continue to photograph them, observe, and document their behaviour.

The Donovan's Day Moth with the small piece (notch) missing from its right hindwing has been patrolling up and down and around my bitumen driveway regularly for at least five days. This individual moth often flies up to me and even tries to land on my face, but it does land on my shoulder or chest and occasionally on my back. It also lands on the same two tree trunks while it is patrolling in the driveway, but mostly on its favoured large Spotted Gum. It nearly always rests on the trunks with head facing downward with the rear of its wing tips resting on the trunk surface. This individual aggressively chases off any other day moths (probably males of the same species) and butterflies much larger than itself. I have nicknamed this individual 'Notchy' due to the small notch missing from the right hind wing. The first time I photographed 'Notchy' was the 19th March.

Cruria donowani – Donovan's Day Moth 'Notchy' in typical resting position on favoured Spotted Gum trunk

Cruria donowani - Donovan's Day Moth lateral view, showing pattern and colours of abdomen

'Notchy' was still patrolling its territory on the 24th March as I could tell it from the photos I took of it resting on the same large tree. 'Notchy' lands on its favoured tree trunk facing upwards, but quickly rotates to face downward in its resting position, as I have observed all other individuals do. It is only when a Donovan's Day Moth settles in this downward position on a tree trunk with its tail and wing tip resting on the tree and head and thorax raised that you are able to see the pattern and the colours of the body from side on.

Cruria donowani partly showing underwing pattern while feeding on Alphitonia excelsa – Red Ash flowers

Cruria donowani perched on plant and logs close to ground level showing fully open wing and abdomen patterns.
Note bright orange abdomen tip

I have only seen and photographed an adult Donovan's Day Moth feeding once. This was on the 24th March on the flowers of *Alphitonia excelsa.* Also, I have only seen and photographed this moth species once resting on plants close to the ground and on a leaf of a low shrub. All the Donovan's Day Moths I have been observing appear to prefer resting on tree trunks at least during the daytime and on the sides of the trunks facing the sun. This is most likely to benefit from the warmth of the sun. The height of perching on trunks is mostly between 0.6 of a metre and 1.7 metres.

Today 31st March, I went up the driveway to see if there were any day flying moths patrolling. I could not believe it when I saw 'Notchy' flying up and down the driveway and landing on its favourite tree. 'Notchy' then flew around me several times and attempted to land on my nose. According to Dr Don Sands, retired CSIRO entomologist, adult day flying moths in the *Cruria* genus can live up to one month. Just imagine the number of kilometres a Donovan's Day Moth would clock up during its lifetime.

Here are some further interesting behavioural observation notes on the *Cruria donowani* – Donovan's Day Moths that patrol our driveway.

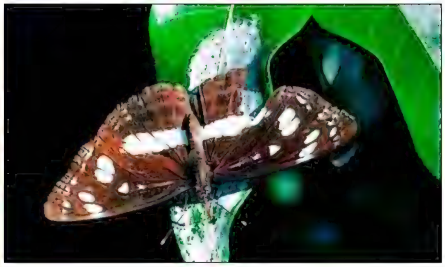
The previously noted and much photographed 'Notchy' Donovan's Day Moth is no longer patrolling our driveway. The last time I noted 'Notchy' patrolling the driveway was the 31st of March. Notchy's territory is now being shared by two other Donovan's Day Flying Moths. When I say shared, it is a constant battle between the two to see who dominates the territory. Both these moth's wings are fully intact, unlike 'Notchy's' with the bit missing on the rear of the right hindwing.

When I stand in the middle of the driveway patrol territory both individuals take it in turns to circle around me just like 'Notchy' did, with each moth landing on my chest or shoulder in turn. Maybe they do not see me as a threat, but just a large object to land on that suddenly appears in the middle of their territory.

Curiously these two new individuals land and rest on the same two trees as 'Notchy', at roughly similar heights and mostly on the same side of the tree facing the driveway. Unlike 'Notchy' when they are in the resting position, both individuals fold their wings closer together. This means that the white bars on the hindwings are not as exposed. I do not know why this should be, but maybe less obvious to predators.

Visual Mimicry

Common Crow butterfly – *Euploea corinna* is toxic and distasteful to predators. Donovan's Day Moth mimics this butterfly species as a defence against predators



Common Aeroplane butterfly - *Phaedyma shepherdi,* like Donovan's Day Moth it has a white band on the hindwings and white spots on the forewings [and similar to the toxic and distasteful Common Crow butterfly]. Note the clubbed antennae, which is a feature that indicates this is a butterfly and not a moth.

Cruria donowani – Donovan's Day Moth is said to mimic the Common Crow Butterfly - *Euploea core* (now *E. corinna*). In some instances, it has been commonly called the Crow Moth. For the Donovan's Day Moth this would be a defence against predation because the Common Crow Butterfly is toxic and distasteful to predators. To me the black and white wing patterning of the Donovan's Day Moth is also reminiscent of the look-alike Common Aeroplane Butterfly – *Phaedyma shepherdi.* I do not believe the Common Aeroplane is toxic though, so like the Donovan's Day Moth it is probably mimicking the Common Crow Butterfly for protection from predators.

Today is the 30th April, 43 days since I first photographed my first Donovan's Day Moth 'Notchy'. There are still two Donovan's Day Moths patrolling the driveway. They still prefer the same large Spotted Gum trunk to land on as 'Notchy' did. While these two individuals fight over who lands on the preferred tree they are not as intent on patrolling the driveway territory as earlier moths did. They sometimes wander off to more distant places and do not come back for some time. Perhaps it's something to do with shortening cooler days and increasingly cooler nights.

Since the 30th of April there do not appear to be any Donovan's Day Moths patrolling our driveway. There is a possibility that they have succumbed to the much colder temperatures in recent nights (as low as 8 degrees Celsius). The only evidence of their existence would be that somewhere there are eggs and or pupae in a dormant state (diapause) waiting over winter for the next warm season with ample rainfall when they will metamorphose into flying adults.

I read that the larvae of this moth species feed on *Boerhavia* spp. – Tar Vines and *Cissus* and *Cayratia* spp. – Native Grapes or Water Vines. It has also been reported that it feeds on *Hibbertia* spp. – Guinea Flowers. The only plant species on our property that hosts the Donovan's Day Moth larva is *Cayratia clematidea* – Slender Grape. I have not found any sign of the use of this vine by Donovan's Day Moth.

As winter draws on, I may not be able to enjoy the presence of Donovan's Day Moth any longer. However, I will certainly be on the lookout for this engaging little moth next season and hopefully will be able to discover further information about its behaviour and life history!

I hear you saying that I have far too much time on my hands, which is true. One of the good things to come out of this awful CORVID-19 threat and self-isolation and social distancing is that it gives me much more time to study nature on our property and have fun with it.

General Information about day flying moths

The day flying moths referred to here are in the Agaristinae subfamily and are now considered to belong to the Noctuoidea superfamily. The subfamily Agaristinae is well represented in Australia by 40 species in 21 genera. Most species fly during the

day, although one or two species come freely to lights at night, while others do occasionally. The adult moths are distinctively marked and brightly coloured, usually in orange, black and white. Some Agaristinae day flying moth larvae are also brightly coloured and striped. A most colourful day flying moth, which many people are familiar with, is the Joseph's Coat Moth – *Agarista agricola*. It even has a couple of other colours, red and blue, that most other day flying moths do not have. There are other day flying moths such as Bee-hawk Moths in the genus *Cephonodes* and Sun Moths in the genus *Synemon,* but these are in completely different superfamilies.

Agarista agricola - Joseph's Coat Moth (male)

Agarista agricola – Joseph's Coat Moth brightly patterned larvae on one of the favoured food plants *Clematocissus opaca* – Small-leaf Grape

Above - The author observing *Cruria donowani* on favoured Spotted Gum tree trunk.

Right – The large Spotted Gum, *Corymbia citriodora* subsp. *variegata,* preferred by the majority of Donovan's Day Moths for settling and resting on in the driveway.

Cruria donowani – Donovan's Day Moth driveway patrol territory flanked by trees of various species and girth dimensions. There is nothing special about the driveway from a human standpoint. However, it appeared to suit the Donovan's Day Moths purposes ideally.

Acknowledgements

My thanks to John Moss for information on references and for commenting on the manuscript.

All photographs by the author.

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Historical and recent observations of Butterfly and Moth aggregation in South-East and Central Coastal Queensland, with special reference to the Blue Tiger butterfly (*Tirumala hamata*) (Nymphalidae: Danainae) and Cluster Moth (*Dichomeris capnites*) (Lepidoptera: Gelechiidae) – *John T Moss*

Introduction

The increased butterfly and moth activity in South-East Queensland in the first half of this year has produced much interest generally and has been widely reported in the lay press. Spokespeople from government agencies, natural history organisations and various other individuals have made appropriate comment. This has led many to ask just where the butterflies had come from and where they ended up. Of course all this unfolded following good rainfall, commencing in mid-January 2020 and continuing on well into March.

Migrating element

The butterflies were in abundance during the months February to May, with some persisting until late in June. Some species were from families that contain regular migrating individuals. In the Pieridae these included the Lemon Migrant (*Catopsilia pomona*) [see Rienks, 1999] and Yellow Albatross (*Appias paulina*), but interestingly, not some regular migrants such as the Caper White (*Belenois java*). In the Nymphalidae we saw a large number of Blue Tigers (*Tirumala hamata*), at times far outnumbering the ever present Common Crows (*Euploea corinna*). Although these Blue Tigers were migrating in a general north-easterly direction, it was apparent that they were not in a hurry, as most if not all were stopping at various nectar sources, especially the common Monkey Rope Vine (*Parsonsia straminea*) which was flowering profusely for many weeks during this warm wet late summer and autumn. Also the Meadow Argus (*Junonia villida calybe*) once common, but scarce for some years during the drought, arrived in droves! Even more interesting, a few of us observed the arrival of individuals of the Migratory Skipper (aka Narrow-winged Awl) (*Badamia exclamationis*), not seen in this region for decades.

This 2020 phenomenon is a repeat of what happened over the summer of 2014/2015, when there was a butterfly explosion following good spring/summer rain. Peter Hendry reported this in issue number 76 (March 2015) of this magazine. Several species, either alone or in company with other species will cluster at nectar sources, as in the photo herein of Blue Tigers and Purple Crows feeding. This is quite apart from the winter (or dry season) roosting aggregation phenomenon, main topic of this article, as discussed below and figured separately.

Dry season aggregations

With shorter days and increasingly cooler weather, progeny of most butterflies begin over-wintering as eggs or pupae. However, many hesperiids persist through winter as

Blue Tiger, Common Crow and Purple Crow feeding aggregation on grasstree (*Xanthorrhoea* sp.) inflorescence. Butterfly Walk, Town of 1770, Discovery Coast – Grumpy Turtle Creative

Mixed dry season aggregation of Purple Crows and Blue Tigers. Butterfly Walk, Town of 1770, Discovery Coast – Denise Wild

Common Crow dry season aggregation – Chillagoe. (Note the two Two-Brand Crows) Garry Sankowsky

Part of a Blue Tiger dry season aggregation Butterfly Walk, Town of 1770 – Denise Wild

slow developing larvae. A few such as the Evening Brown (*Melanitis leda*) and the Large Grass-Yellow (*Eurema hecabe*) persist as adults but become less active; some such as two of the other grass-yellows (*Eurema herla* and *E. laeta*) go into a process of adult diapause, being almost completely inactive with marked slowing of their metabolism [see below and Jones, 1999]. Marie Tarrant has recently found a small aggregation of dry season females of *E.herla* in adult diapause at her Kobble Creek, SEQ property [see photo].

This seasonal change with decreasing photoperiod and temperature, and probably lower rainfall, stimulates a process known as reproductive dormancy, seen mainly in the pierids and danaine butterflies, although Moore (1999) also describes this process in the Bushbrown satyrids (*Mycalesis* species), and there are others. This period of clustering/roosting is well known with the North American migrating Monarch butterfly (*Danaus plexippus*). This commences when the butterflies aggregate in protected areas, and aside from occasionally imbibing water and minerals, live off their fat reserves until they later disperse for breeding. Some, but not all, of our danaines exhibit this phenomenon. Our local *D. plexippus*, although non-migratory, do have winter clusters, in particular near Sydney, although a few small SEQ aggregations are known, but with much fewer individuals (Smithers, 1977 & 1983). Observations over long periods have shown that danaine cluster sites can be long term or temporary. Lesser Wanderers (*Danaus petilia*) and several crow species will migrate, especially in inland areas, and will form temporary roosts in sheltered areas during the dry season (Zalucki, 1999). Common danaine cluster sites are located in coastal dune swales, creek beds in riparian or gallery forest, sheltered gullies in littoral rainforest or dry vine scrub, paperbark forests in wetlands; and in more arid inland regions, commonly are found in sandstone or limestone gorges in or adjacent to monsoon forest and vine thickets.

Kitching and Zalucki (1981) have discussed the phenomenon of aggregation in the Common Crow with reference to a sheltered gully on the Nathan Campus of Griffith University. Monteith (1982) summarised dry season aggregations of various insects including Common Crows and other danaines in cooler monsoon forest patches within the drier sclerophyll forest and woodland in northern Australia. He notes among the favoured locations for the butterflies were the rock walls of gorges and river banks as well as the trunks and buttresses of large banyan-like fig trees with evergreen canopies. Scheermeyer (1987) went into the biological aspects of the Common Crow, Blue Tiger and related danaines including their propensity for winter (dry season) aggregations and more recently (1999) published a comprehensive monograph on the biology of these species with a comparative treatise on all the aggregating Australian *Euploea.* The monsoon forest, dry season aggregations of *E. corinna* on the rock walls of the Butterfly Gorge section of the Katherine Gorge (Nitmaluk) National Park, are a well-known tourist drawcard.

Mixed pierid and lycaenid aggregation on soak 40 Mile Scrub – Garry Sankowsky

White Migrant (*Catopsilia pyranthe*) aggregation on soak, 40 Mile Scrub – Garry Sankowsky

Blue Tiger dry season aggregations

Among the long term, frequently used aggregation sites are those of the Blue Tiger (*Tirumala hamata*) in central coastal Queensland both on the mainland and off-shore islands. Scawfell Island 50 km north-east of Mackay and Magnetic Island off Townsville are known for their immense aggregations of Blue Tiger butterflies. In fact the semi-permanent aggregation site on the latter island has become quite a tourist attraction. Along the Queensland Central Coast south of Gladstone and due east of Miriam Vale, in an area now advertised as the Discovery Coast, lie the twin towns of Agnes Water and Seventeen Seventy. For obvious reasons the area has been promoting itself using the Cook/Banks connection, but more so recently in view of the 250 year anniversary (although now somewhat reduced in scope due to the current Covid-19 Pandemic). At nearby Round Hill Head (named by Cook), local newspaper editor (and BOIC member) Denise Wild and her associates have been promoting the "Butterfly Walk" track through the Crow and Blue Tiger feeding areas and aggregation sites within the Joseph Banks Conservation Park; and within the township have commenced "The Butterfly Effect" project incorporating Blue Tiger and other butterfly dominated murals.

In September 1994, whilst camping with members of the Queensland Naturalists' Club on Scawfell Island, I was able to witness one such aggregation of these spectacular butterflies. I quote from my butterfly paper in the Scawfell Island issue [December 1995] of The Queensland Naturalist: "The commonest butterfly was the Blue Tiger, *Tirumala hamata hamata*, present in tens of thousands in a dry season aggregation, occupying mainly the rainforest gullies. It was assumed they had migrated to the island and overwintered. Their primary host plant *Secamone elliptica* was not found although their secondary host plant *Cynanchum carnosum* was present in large amounts in an area near a tidal creek; however there were no signs of eggs, larvae, previous feeding or empty pupal cases. This supports the observations of Scheermeyer (1993) that the latter is rarely used as a food plant. Anecdotal information from Queensland Parks and Wildlife Service officers, and others, include reports of a westward or south-westward migration back to the mainland in December 1994".

In the same issue, a separate paper by Peter Woodall described in detail how the Blue Tiger butterflies regularly imbibed moisture and minerals from the brackish water of the damp sand, thereby confirming Ackery & Vane-Wright's 1984 observational statement (not mentioned in Common & Waterhouse 1972 & 1981).

Historical connections

In my paper I also included a quote from Peter Valentine (1988) [which is of some current historical interest in this 250 year anniversary of the barque *Endeavour's* 1770 visit to this coast], where he stated: "Although a specimen of the Blue Tiger was not included in the Banks' Collection, there is a description in his journal of a vast aggregation of butterflies which appear to have been Blue Tigers. On 29th May 1770, when the *Endeavour* was almost halfway between the latitudes (of what were to

become) Rockhampton and Mackay, Banks reported seeing 'acres' of them!" In this isolated area north of Shoalwater Bay, named by Cook "Thirsty Sound", Banks' journal makes it clear that these butterflies were not just flying around but were roosting on "every branch and twig" [as in Monteith, 1982].

Recent SEQ butterfly aggregations

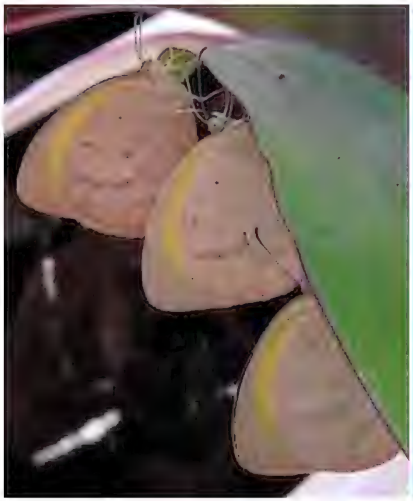
In June this year, our local Common Crows and Blue Tigers began to move to coastal winter/dry season roosting sites where large aggregations of butterflies took place. In sheltered areas near mangroves and saltmarsh they were joined by Swamp Tiger (*Danaus affinis*) individuals who had bred locally on Mangrove Milk Vine

Aggregation of Large Grass Yellows (*Eurema hecabe*) at soak Woodstock Rd, Giru NQ, 01 May 2019 – Aub Podlich

Pale Triangle Yellow Albatross males mud-puddling cluster. Perry River 1 Nov 2007 Ross Kendall

Chequered Swallowtail (*Papilio demoleus*) mud puddling cluster. Lake Murphy Taroom 26 Feb 2011 – John Moss

Pea Blue (*Lampides boeticus*) aggregation on soak. 40 Mile Scrub – Garry Sankowsky



Macleay's Grass-yellow females in dry season aggregation July 2020
Marie Tarrant

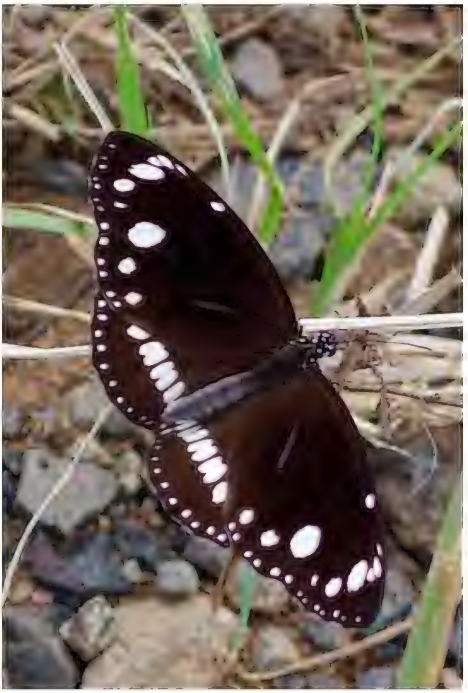
Swamp Tiger (*Danaus affinis*) from winter agg'n. Geoff Skinner Wetlands, Redlands Coast SEQ 18 May – 2020 Kathy Clark

(*Cynanchum carnosum*). Recently, I witnessed these mixed aggregations at three sites, namely on the Sunshine Coast at Yandina Creek Wetland Reserve near the confluence with the Maroochy River; in the Geoff Skinner Wetland Reserve on Moreton Bay at Wellington Point; and in Orchard Beach Estate council reserve at Redland Bay. However, not far from this last-named site, but further from the coast in a paperbark forest of the Carbrook Wetlands, an aggregation site contained only

Common Crows. Furthermore, nearby, in a small patch of dry vine scrub on the bank of the Logan River and adjacent to the Loganholme Wetlands (in the Logan City suburb of Cornubia) I observed about a dozen individuals of the glorious Purple Crow (*Euploea tulliolus*) in a small cluster, with about the same number of Common Crows. Their only known host plant, the Burny Vine (*Trophis scandens*), was very common, accounting for their presence at that site.

Purple Crow (*Euploea tulliolus*) from winter aggregation Loganholme Wetlands SEQ 15 June 2020 – Kathy Clark

Blue Tiger (*Tirumala hamata*) individual from winter agg'n. Geoff Skinner Wetlands, Redlands Coast SEQ – Kathy Clark



Common Crow (*Euploea corinna*) (male) Aub Podlich

Other butterfly clustering phenomena

In relation to the Blue Tiger drinking behaviour, I should mention another type of butterfly clustering wherein individuals come together to imbibe water, minerals and nitrogenous compounds (such as urea) at soaks, wet sand or mud puddles. These drinking clusters are called "mud-puddling" and in the main it seems to be the male sex again that is commonly involved. Included are species from the Papilionidae and Pieridae, although it can include a few species of the Lycaenidae. The phenomenon is most commonly seen in the tropics and usually on hotter days. Common SEQ species seen mud-puddling are Kite Swallowtails (*Protographium* & *Graphium* species), Chequered Swallowtail (*Papilio demoleus*), Yellow Albatross (*Appias paulina*) and Large Grass-Yellow (*Eurema hecabe*). Further north and west other species such as

the White Migrant (*Catopsilia pyranthe*) and Tailed Pea-Blue (*Lampides boeticus*) can be seen mud-puddling.

Another type of butterfly "aggregation" involves small numbers of males of certain species in the Nymphalidae, and to a lesser extent the Pieridae and Lycaenidae, which sometimes imbibe from plants that contain the pyrrolizidine alkaloids that are necessary for reproduction and the cardiac glycosides used for chemical protection from predation. Some danaines mentioned above, satyrids such as the Evening Brown, pierids such as the grass-yellows and lycaenids such as the pea-blues can exhibit this behaviour.

Moth clustering

Cluster Moths (*Dichomeris capnites*) Perry River, Sept 2006 – Ross Kendall

Although the above has focussed on butterfly aggregation, moths such as the well-known alpine clustering Bogong Moth (*Agrotis infusa*) and the Grannies Cloak Moth (*Speiredonia spectans*) are known to aggregate; the latter in dry, warm, dark sites such as in attics, barns, closets, outside toilets and even under car bonnets! This type of aggregation is likely to be a reproductive dormancy similar to the butterflies.

One of the most interesting (autumn) phenomena is the tight clustering (like roofing shingles!) of thousands of small Cluster Moths (*Dichomeris capnites*) [fam Gelechiidae] packed together on leaves of various trees, mainly in moist riparian areas, such as on the creekline Weeping Lilipilli (*Waterhousea floribunda*) [personal observations of JTM and colleagues on the Hendry property west of Childers] and on Umbrella Trees and *Livistona* palms growing in the Australian sections of the Mt Coot-tha Botanic Gardens [JTM, R. Kendall and P. Hendry personal observations]. This recent autumn, members of Save Our Waterways Now have found clusters on both *Waterhousea* and Black Bean (*Castanospermum australe*) along Enoggera Creek. Although clusters are reported most years, the year 2004 appears to have been a boom year for the species. Burwell & Wright (2004) state that "the function of these autumn aggregations is unknown. They do not appear to be involved with over-wintering as the moths appear to largely disperse by late May or early June." They illustrate their article with images of the moth coating the leaves of the North Queensland rainforest climber Native Monstera (*Epipremnum pinnatum*).

When disturbed, these small pale-brown moths [wing-span approx. 2 cm] will erupt into flight *en masse*, causing their resting substrate to suddenly rise up! Rarely, the combined weight of the cluster can be enough to break a smaller branch! Although reported in Common (1990) that their larvae feed on the "green foliage of *Acronychya* species", in my opinion this is an assumption and what was witnessed was only an adult cluster; it is most likely that their host foods are the dried fallen leaves on the forest floor, as is the case with at least one other of this genus of moths which is known to feed on dead eucalypt leaves.

Acknowledgements

I thank Ross Kendall for sourcing photos of butterfly clusters from his extensive photo gallery as well as those photographers whose names are on the photo captions above. Also thanks to Geoff Monteith and Peter Hendry for assistance with references and helpful comments and Peter especially for jogging my memory as to our previous experience with butterfly and moth aggregations in the Mt Coot-tha Botanic Gardens and on his "bush block"!

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The genus *Charaxes* (Lepidoptera: Nymphalidae) a look at the Australian species from an historical perspective and an overall view of the world taxa – continued from Metamorphosis Australia Issue No. 96 – *Peter Hendry*

Hadrianus group contains 2 species

Fig. 78

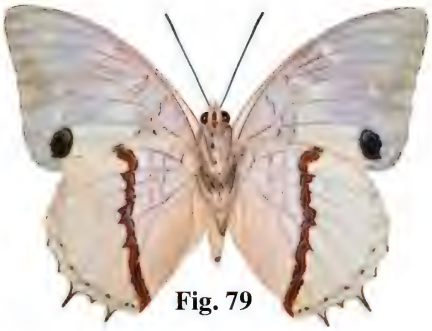

Fig. 79

Charaxes hadrianus Ward, 1871 (Figs 78 & 79) the type species comes from Cameroon, it is also found in Central African Republic, Congo, Democratic Republic of Congo, Gabon, Ghana, Guinea, Ivory Coast, Liberia, Nigeria, Sierra Leone and Uganda. The larvae feed on species of *Ouratea* and *Ochna* (Ochnaceae).

The other species in the Harianus group is *Charaxes lecerfi* Lathy, 1925.


Fig. 80♂


Fig. 81♀

Cynthia group contains 7 species

Charaxes cynthia cynthia Butler, 1866 the male was illustrated (Fig. 80) along with the original description, figure 81 is a female from the Pickering collection. The type location is given as Ashanti which is located in south Ghana, it also occurs in Gambia, Ivory Coast, Liberia, Nigeria, Senegal and Sierra Leone. The larvae feed on *Albizia zygia* (Fabaceae), species of *Celtis* (Cannabaceae), *Coffea* (Rubiaceae), *Garcinia* (Clusiaceae), *Griffonia* (Fabaceae), *Klainedoxa* (Clusiaceae) and


Fig 82♂


Fig. 84♂


Fig. 83♀

Phialodiscus (Sapindaceae). There are four other subspecies involved; ***C. c. kinduana*** Le Cerf, 1923 [(Fig. 82), in the Guyomar collection simply as *Charaxes cynthia*, I believe best fits this subspecies] is found in Cameroon, Central African Republic, Congo, Democratic Republic of Congo, Gabon, Nigeria, Sudan and Uganda; *C. c. mukuyu* van Someren, 1969 from Tanzania; *C. c. parvicaudatus* Lathy, 1926 from Kenya, Tanzania and Uganda and *C. c. sabulosus* Talbot, 1928 from the Democratic Republic of Congo and Zambia.

Charaxes protoclea protoclea Feisthamel, 1850 like many is a sexually dimorphic species, the female was illustrated by Herrich-Schäffer, [1850] under the synonym *Charaxes aeson* (Fig. 83). The male was illustrated by Schultze, 1916 under *Charaxes protoclea* ab. ablutus (Fig. 84). The type species is from Casamance, Senegal it also occurs in Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Nigeria, Sierra Leone and Togo. The larvae feed on *Afzelia quanzensis*, *Brachystegia spiciformis*, and *Julbernardia globiflora* (Fabaceae). There are five other subspecies involved *C. p. azota* (Hewitson, 1877) from Kenya, Malawi, Mozambique, South Africa, Tanzania, Zambia and Zimbabwe; *C. p. catenaria* Rousseau-Decelle, 1934 from the Democratic Republic of Congo, Tanzania and Zambia; *C. p. cedrici* Canu, 1989 from Equatorial Guinea; *C. p. nothodes* Jordan, 1911 from the Democratic Republic of Congo, Tanzania and Uganda and ***C. p. protonothodes*** van Someren, 1971 (Fig. 85) from Angola, Cameroon, Central African Republic, Congo, Democratic Republic of Congo, Gabon and Nigeria.

Fig. 85♂

The other species in the Cynthia group are, *Charaxes boueti* Feisthamel, 1850, *Charaxes rectans* Rothschild & Jordan, 1903, *Charaxes alticola* Grünberg, 1911, *Charaxes lasti* Grose-Smith, 1889 and *Charaxes macclounii* Butler, 1895.

Varanes group contains 9 species

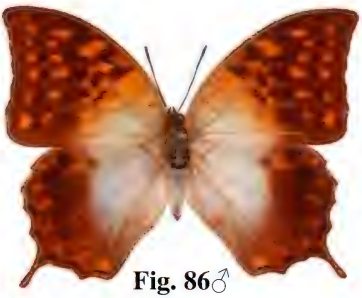

Fig. 86♂

Fig. 87♂v

Charaxes varanes varanes (Cramer, 1777) (Figs 86 to 88) this species is reported as being first described and illustrated (Fig. 89) in volume four of Seba's "Thesaurus"[7], 1765 (though I can see little resemblance). *C. v. varanes* was not named in this volume as no name was given, only its position in Linnaeus's classification was noted. The type location is unknown to me, the location given by Cramer as "*on the island of Amboina and on the Coast of Coromandel*", is clearly in error, as it is known from Mozambique, South Africa and Swaziland. The larvae feed on species of *Allophylus* and *Cardiospermum* (Sapindaceae). There are three other subspecies involved; *C. v. bertrami* Riley, 1931 from Oman and Yemen; *C. v. torbeni* Turlin, 1999 from Yemen and *C. v. vologeses* (Mabille, 1876) from Angola, Benin, Botswana, Burkina Faso, Cameroon, Central African Republic, Equatorial Guinea, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Kenya, Liberia, Mozambique, Namibia, Nigeria, Senegal, Sierra Leone, Sudan, Tanzania, Togo, Uganda, Zambia and Zimbabwe.

Fig. 88♀

Fig. 89

Charaxes analava Ward, 1872 (Figs 90 & 91) the sexes are similar. The type location was given as Madagascar to which it is endemic. The larvae and food plants appear to be unknown.***Charaxes fulvescens fulvescens*** (Aurivillius, 1891) (Figs 92 & 93) originally described by Aurivillius as a variety of *Varanes*. The type species is from Cameroon, it also occurs in the Central African Republic, Congo, Democratic Republic of Congo, Gabon, Kenya and Nigeria. The larvae probably feed on *Allophylus* species (Sapindaceae). There are four other subspecies involved; *C. f. imenti* Plantrou, 1989 from central Kenya; *C. f. marialuisae* Canu, 1989 from Equatorial Guinea; *C. f. monitor* Rothschild, 1900 from Burundi, Central African Republic, Democratic Republic of Congo, Rwanda, Sudan, Tanzania, Uganda and

Zambia and *C. f. senegala* van Someren, 1975 from Benin, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Nigeria, Senegal, Sierra Leone and Togo.

The other species in the Varanes group are, *Charaxes defulvata* Joicey & Talbot, 1926, *Charaxes saperanus* Poulton, 1926, *Charaxes nicati* Canu, 1991, *Charaxes acuminatus* Thurau, 1903, *Charaxes obudoensis* van Someren, 1969 and *Charaxes balfouri* Butler.

Fig. 90

Fig. 91

Fig. 92

Fig. 93

Fig. 94

Fig. 95

Jasius group contains 27 species and is the largest group in the subgenus *Charaxes*

Charaxes jasius (Linnaeus, 1767) (Fig. 94) is the type species for the genus *Charaxes*. As mentioned above it is the only European species of the genus though also occurring in the Afrotropical region. The larvae feed on a wide range of plants from a number of plant families including, Annonaceae, Cannabaceae, Celastraceae, Ericaceae, Euphorbiaceae, Fabaceae, Malvaceae and Lauraceae. ***Charaxes andara*** Ward, 1873; (Fig. 95) the type species is from Madagascar. It is endemic to Madagascar and found in forests all over the island. I found nothing on its larval food plants.

Charaxes brutus brutus (Cramer, 1779) was illustrated (Fig. 96) along with the original description. The type location was given as "Cape of Good Hope, South Africa", which has been noted as false by several proceeding authors. *C. b. brutus* occurs in Benin, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Nigeria, Senegal, Sierra Leone and Togo. The larvae feed on *Grewia* species (Malvaceae), *Blighia unijugata* (Sapindaceae), *Entandrophragma delevoi*, *Melai azedarach*, *Trichilia dregeana*, *Trichilia emetica*, and *Ekebergia capensis* (Meliaceae). There are four other subspecies involved; *C. b. alcyone* Stoneham, 1943 from Tanzania; ***C. b.* angustus** Rothschild, 1900 (Figs 97 & 98) from Angola, Cameroon, Central African

Fig. 96

Fig. 97

Fig. 98

Republic, Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon, Kenya, Nigeria, Sudan, Tanzania, Uganda and Zambia; C. *b.* natalensis Staudinger, 1885 from Angola, Botswana, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe, and *C. b. roberti* Turlin, 1987 from Tanzania.

Charaxes castor castor (Cramer, 1775) (Figs 99♀ & 100♀v) the type species is from Guinea, it also occurs in Angola, Benin, Burkina Faso, Cameroon, Central African Republic, Congo, Democratic Republic of the Congo, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea-Bissau, Ivory Coast, Kenya, Liberia, Nigeria, Senegal, Sierra Leone, Tanzania, Togo, Uganda and Zambia. The larvae feed on *Bridelia micrantha*, (Phyllanthaceae); *Afzelia quanzensis*, *Schotia brachypetala*, *Cassia fistula* (Fabaceae); *Gymnosporia* spp., *Maytenus senegalensis* (Celastraceae) and *Tragia* spp. (Euphorbiaceae). There are three other subspecies involved, *C. c. arthuri* van Someren, 1971 from Tanzania; *C. c. comoranus* Rothschild, 1903 from Comoros and *C. c. flavifasciatus* Butler, 1895 from Malawi, Mozambique, South Africa, Swaziland, Tanzania and Zimbabwe.

Fig. 99♀

Fig. 100♀v

Charaxes eudoxus eudoxus (Drury, 1782) was illustrated (Fig. 101) along with the original description. The type species is from Sierra Leone, it also occurs in Ghana, Guinea, Ivory Coast, Liberia and Nigeria. The larvae feed on species of *Schefflera* (Araliaceae), *Syzygium* (Myrtaceae) and *Garcinia* (Clusiaceae). There are eleven other subspecies involved; *C. e. amaurus* Poulton, 1929 from Kenya; *C. e. boersmana* Plantrou, 1980 from Nigeria; *C. e. cabacus* Jordan, 1925 from Uganda; *C. e.*

Fig 101

goubandana Nicat, 2002 from Guinea; *C. e. imatongensis* Plantrou, 1982 from Sudan; *C. e. katerae* Carpenter, 1937 from Tanzania and Uganda; *C. e. lequexi* Plantrou, 1982 from Burundi and Rwanda; ***C. e. mechowi*** Rothschild, 1900 (Figs 102 & 103) from Angola, Cameroon, Central African Republic, Congo, Democratic Republic of Congo, Gabon, Nigeria, Sudan, Tanzania, Uganda and Zambia; *C. e. mitchelli* Plantrou & Howarth, 1977 from Zambia; *C. e. raffaellae* Plantrou, 1982 from Burundi and Tanzania, and *C. e. zambiae* van Someren, 1970 from Zambia.

Fig 102♂

Fig 103♂v

Charaxes hansali hansali C. & R. Felder, [1867] was illustrated (Fig. 104) along

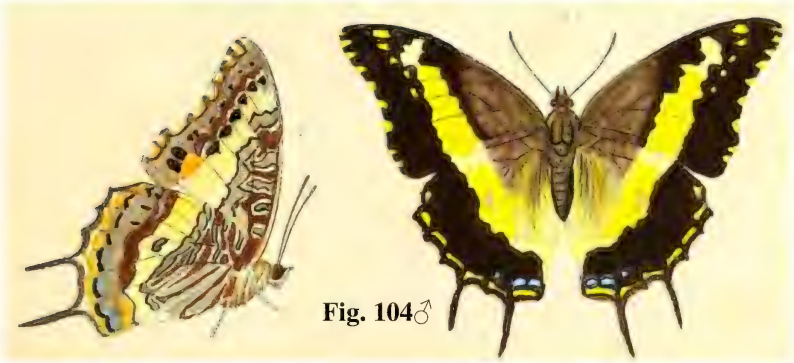

Fig. 104♂

with the original description. The type location was given as "Bogos, Africa" an area in Eritrea, it also occurs in Sudan, Ethiopia, Somalia, Uganda, Rwanda, Kenya, Tanzania, Saudi Arabia, Yemen, Oman and south-east Egypt. The larvae feed on *Salvadora persica, Dobera glabra* (Salvadoraceae); *Osyris lanceolata* and *Colpoon compressum* (Santalaceae). There are four other subspecies involved; *C. h. arabica* Riley,

Fig. 105♂

1931 from Oman; ***C. h. baringana*** Rothschild, 1905, (Fig. 105) from Kenya, Ethiopia, Rwanda, Sudan, Tanzania and Uganda; *C. h. kulalae* van Someren, 1975 from Kenya and Ethiopia south to Nighelli and *C. h. yemeni* Turlin, 1998

Charaxes pollux pollux (Cramer, 1775) (Fig. 106) the type location was given as "Cote de Guinée" (coast of Guinea), it also occurs in Sierra Leone, Liberia, Ivory Coast, Ghana, Nigeria, Cameroon, Equatorial Guinea, Gabon, Congo, Angola, Central African Republic, Democratic Republic of Congo, Sudan, Uganda, Rwanda, Burundi, Kenya, Tanzania, Malawi, Zambia, Mozambique and Zimbabwe. The larvae feed on *Bersama abyssinica* (Melianthaceae); *Deinbollia borbonica*, *Deinbollia kilimandsharica* (Sapindaceae), *Flueggea virosa* (Euphorbiaceae) and *Sorindeia* species (Anacardiaceae). There are six other subspecies involved; *C. p. annamariae* Turlin, 1998 from Equatorial Guinea; *C. p. gazanus* van Someren, 1967 from Mozambique, Zimbabwe; *C. p. geminus* Rothschild, 1900 from Malawi, Tanzania, Zambia; *C. p. maua* van Someren, 1967 from Tanzania; *C. p. mira* Ackery, 1995 from Tanzania and *C. p. piersoni* Collins, 1990 from Tanzania.

Fig. 106

Charaxes saturnus saturnus Butler, 1865 was illustrated (Fig. 107) along with the original description. Figure 108 was in the Guyomar collection as *C. jasius brunnescens* but has reciently been placed in synomony with *Charaxes saturnus saturnus*, (Mendes, Bivar-de-Sousa, Vasconcelos & Van-Dúnem Santos, 2017). The type location is "Interior of Africa", it has been recorded from Angola, Botswana, Central African Republic, Democratic Republic of the Congo, Ethiopia, Gabon,

Fig. 107 ♂

Fig. 108

Kenya, Malawi, Mozambique, Namibia, Somalia, South Africa, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe. The larvae feed on species of *Cassine*, *Catha*, *Maytenus* (Celestraceae), *Afzelia*, *Bahuinia*, *Brachystegia*, *Burkea*, *Colophospermum*, *Copaifera* and *Schotia* (Fabaceae). There are two other subspecies involved, *C. s. harrisoni* Sharpe, 1904, from Kenya, Uganda and Tanzania, and *C. s. pagenstecheri* Poulton, 1926, from Ethiopia and Somalia.

The other species in the Jasius group are, too numerous to name here and can be found in Wahlberg's checklist at (http://www.nymphalidae.net/Nymphalidae/Classification/Cha_Charaxini.htm) under the subgenus *Charaxes* from SPEC *Charaxes jasius* (Linnaeus, 1767) to SPEC *Charaxes ducarmei* Plantrou, 1982.

Lucretius group contains 4 species.

Fig 109♂

Charaxes lucretius lucretius (Cramer, 1775) was illustrated (Fig. 109) along with the original description. The type location was given as "Côte de Guinée" (coast of Guinea) it is also found in Senegal, Guinea Sierra Leone, Liberia, Ivory Coast, Ghana, Togo and Nigeria. The larvae feed on *Annona senegalensis* (Annonaceae); *Hugonia platysepala* (Linaceae) and Trema species (Ulmaceae).

Fig. 110 ♂

Fig. 111 ♂v

There are four other subspecies involved; ***C. l. intermedius*** van Someren, 1971 [(Figs 110 & 111) in the Pickering collection simply as *Charaxes lucretius*' best fit this subspecies] from Nigeria, Cameroon, Equatorial Guinea, Gabon, Congo, Central African Republic, Democratic Republic of Congo and Zambia; *C. l. maximus* van Someren, 1971 from Democratic Republic of Congo, Uganda, Rwanda, Burundi, Kenya and Tanzania; *C. l. saldanhai* Bivar de Sousa, 1983 from Angola, and *C. l. schofieldi* Plantrou, 1989 from Zambia.

The other species in the Lucretius group are, *Charaxes lemosi* Joicey & Talbot, 1927, *Charaxes odysseus* Staudinger, 1892 and *Charaxes lactetinctus* Karsch, 1892.

to be continued

OBITUARY

Denis Kitchin, personal recollections of a remarkable individual, by John T St L Moss.

I first met Denis whilst on a long excursion jointly run by the Queensland Naturalists' Club and a mixed group from the Rockhampton Branch of Native Plants Queensland [then SGAP Rockhampton] and the local Field Naturalists (most of whom were also members of the SGAP). Being a member of both, Denis was equally at home with a native plant or a beetle in his hand, even better if it was a plant with a butterfly caterpillar feeding off it! I had heard of Denis, a known beetle man and member of the Entomological Society of Qld, living since his retirement with his sister Joanne in Gracemere, an outer suburb of Rockhampton.

The 12-day camp, in late July 2010, was held in good weather at the Byfield National Park, with its rich species diversity of nearly everything, including butterfly and moth host plants, particular interests of both of us. I was even more heartened when I discovered that he had a good working knowledge of the local mistletoes, with all bar one located during the excursion. I introduced him to the BOIC which he eagerly joined when he saw the quality of the early numbers of our new colour magazine.

In the following almost ten years I saw Denis from time to time, often as he passed through on his way back from a field trip (with his friend Trevor Jack) in NSW or western Qld and/or from a visit to his daughter's at Kingscliff. Knowing that I was preparing a book on mistletoes he would often arrive with a specimen of same or a mud map, fully detailed and intricately drawn in pencil, as to where I could find a particular mistletoe host plant association. Then one day, about 6 months after the publication of Ross and my book, Denis appeared with his own excellent limited edition fully bound book "Mistletoes of Capricornia", covering all 22 species from that region. It had gone to the printers just before our book but he had kept it a secret "so as not to steal (our) thunder"!
Denis was equally at home using his hands, as he had been a carpenter and manual arts teacher at various times, and had no trouble constructing his own insect cabinets to house his beetle and other insect specimens. He was extremely good company for a number of

reasons and his witty sarcastic commentary was extremely entertaining. I never heard him say a bad word about anybody, and any criticism was always constructive.

Unfortunately for most of the time I knew him, Denis was fighting a constant battle against two coincident invasive terminal cancers, although I never heard a word of complaint from him. His amazing doggedness and resilience in adversity was inspirational. He died peacefully on the 7th of June 2020 at the age of 78, eleven days short of his 79th birthday. He will be sadly missed by his family, friends and colleagues ("mates" to him!). It was a pleasure to know such a talented but very modest, unselfish person who always put the interests of others first. Vale, Denis!!

A fuller version obituary by Monteith, Moss and Hutchinson will appear in the September issue of the News Bulletin of the Entomological Society of Queensland.

FROM THE EDITOR

I have received the following email from Cliff Meyer.

Good afternoon Daphne,

I would like to draw attention to an incorrect statement made in Dennis Bell's article, Notes on the life history of the Orange Tiger (*Danaus genutia alexis*). On page 27 of the magazine Dennis states "However all the specimens he raised were dark form larva." This statement is incorrect.

When I first discovered the life history of the butterfly at Ivanhoe Crossing, Kununurra in December 1993, I collected and successfully reared to adult all larval colour forms.

In my paper, referenced in Dennis's article, I noted that "All larvae reared in captivity **from egg or early instar** took on the dark form". The pale form larvae illustrated in my paper were successfully reared to pupae while I was in the field later emerging as adults on my return to Darwin. The note that I made in the paper was regarding the eggs and early instar larvae that I reared on cuttings of the hostplant on my return to Darwin. They all took on the dark form of the larvae. The beige and black forms of the larva are the extreme forms and were not often encountered in the wild.

I'd appreciate it if this could be corrected in the next issue of the magazine.

Yours sincerely

Cliff Meyer

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South Australian Jewel Beetles, family BUPRESTIDAE

In 2014, Peter Lang, a botanist at the State Herbarium, provided Metamorphosis Australia with many images of Jewel beetles that he had become interested in while on botanical explorations. We can now all enjoy his work with these beetles in his newly released web site.

Here is what Peter Lang has to say about this site: "I thought you might be interested in the link below which gives access to my just launched 'Buprestidae of South Australia (jewel beetles)' web pages.

While it is still incomplete in parts, I have decided that now is the right time for it to go public. I have only held back information on about six species that I am currently working on for publications. http://syzygium.xyz/buprestidae/taxonomy.php

For a cursory look, I am suggesting that people check out:

- *Melobasis propinqua verna,* which has the most comprehensive documentation for breeding stages and host plants,

- *Temognatha congener*, a particularly beautiful and rare species,
- any of the *Ethonion* species, of special interest for their gall-making habit,
- *Castiarina erythroptera* and *C. subtestacea* for examples of mimicry;
- species in *Castiarina* and *Melobasis* which are the two largest genera, and *Temognatha* which has the largest beetles; - each have some very colourful species.

****

A pdf, titled "Natural Enemies of Butterflies" has been provided by Professor Mike Keller of the Adelaide University. As the document is 31 pages in length I could not include it here but have put it in Dropbox - https://www.dropbox.com/s/iwom1lj87jt8bct/Natural%20enemies%20of%20butterflies%20Mike%20Keller%20march%202020.pdf?dl=0
I realise that this would be rather onerous to type in the address bar, so if you would like a copy of the pdf, please email me at daphne.bowden1@bigpond.com.

SEED BANK

Alternanthera denticulata
Aristolochia acuminata (Tagala)
Aristolochia macroura
Asclepias curassavica
Asystasia gangetica
Brachychiton populneus
Crotalaria grandiflora
Hygrophila angustifolia
Melicope elleryana
Pararistolochia praevenosa
Senna acclinis
Senna gaudichaudii
Senna retusa var. *glabra*
Sesbania cannabina

There are small quantities of host plant seeds available. If you require any of them, please send a stamped, self-addressed envelope to Daphne Bowden, 24 Rickston Street, Manly West Qld. 4179 and list which seeds you require.

DISCLAIMER

The magazine seeks to be as scientifically accurate as possible but the views, opinions, and observations expressed are those of the authors. The magazine is a platform for people, both amateur and professional, to express their views and observations about invertebrates. They are not necessarily those of the BOIC. The manuscripts are submitted for comment to entomologists or people working in the area of the topic being discussed. If inaccuracies have inadvertently occurred and are brought to our attention, we will seek to correct them in future editions. The Editor reserves the right to refuse to print any matter which is unsuitable, inappropriate or objectionable and to make nomenclature changes as appropriate.

ACKNOWLEDGEMENTS

Producing this magazine is done with the efforts of:

- Those members who have sent in letters and articles
- Peter Hendry who provided the cover painting
- Daphne Bowden who works on layout, production, and distribution
- John Moss, Peter Hendry, Garry Sankowsky and Ross Kendall for scientific referencing and proof-reading of various articles in this issue of the magazine